

We Claim:

1. A method of rendering at an output device data content that is accessible from an information apparatus, the output device including an output engine, the method comprising:

receiving at the information apparatus information relating to the output device;

establishing a channel of communication between the information apparatus and the output device;

obtaining at the information apparatus one or more device-dependent components relating to the output device;

generating at the information apparatus device-dependent output data employing at least in part one device-dependent component; and

transmitting the device-dependent output data via the communication channel to the output device for rendering.

2. The method of claim 1 in which the channel of communication includes a wireless communication channel.

3. The method of claim 1 in which the information apparatus includes one of a mobile computing device, a pervasive device, a digital camera, and a personal computer.

4. The method of claim 1 in which the output device includes one of a printing device, a display device, and an audio output device.

5. The method of claim 1 in which the device dependent output data includes compressed data.

6. The method of claim 1 in which the information relating to the output device is obtained from the output device.

7. The method of claim 1 in which the one or more device-dependent components include software code.

8. The method of claim 1 in which the one or more device-dependent components include a software application.

9. The method of claim 1 in which the one or more device-dependent components include at least part of a device driver.

10. The method of claim 1 in which the one or more device-dependent components includes information relating to the output device.

11. The method of claim 1 in which the device dependent output data is received by an output controller before being delivered to the selected output device.

12. The method of claim 11 in which the output controller is internal to the output device.

13. The method of claim 11 in which the output controller is one of a server, an external controller and a data access point.

14. The method of claim 11 in which the output controller performs, at least partially, raster image processing on the data content.

15. The method of claim 11 in which the output device includes an output engine, the method further including converting the output data content into a form compatible with the output engine.

16. The method of claim 11 in which the output device is a printer and includes a printer controller, the method further including converting the output data into a form compatible with the printer controller.

17. The method of claim 1 further comprising providing payment information from the information apparatus to pay for the rendering provided by the output device.

18. A method of rendering data content that is accessible from an information apparatus, comprising:

selecting an available output device having a device-specific output engine;

automatically uploading to the information apparatus one or more device-dependent components corresponding to the output device;

generating at the information apparatus device dependent output data in accordance with the one or more device-dependent components; and

transmitting the output data from the information apparatus to the output device for rendering.

19. The method of claim 18 further comprising providing payment information from the information apparatus to pay for the rendering provided by the output device.

20. The method of claim 18 in which the uploading of the one or more device dependent components includes wireless communication.

21. The method of claim 18 in which the information apparatus includes one of a mobile computing device, a pervasive device, a digital camera, and a personal computer.

22. The method of claim 18 in which the output device includes one of a printing device, a display device, and an audio output device.

23. The method of claim 18 in which the device dependent output data includes compressed data.

24. The method of claim 18 in which the selecting of an available output device involves user input.

25. The method of claim 18 in which the selecting of an available output device includes the information apparatus discovering the output devices.

26. The method of claim 18 in which the one or more device dependent components include software code.

27. The method of claim 18 in which the one or more device dependent components include a software application.

28. The method of claim 18 in which the output device is a printer and the one or more device-dependent components include at least part of a printer driver.

29. The method of claim 18 in which the one or more device dependent components relate to one or more of a device driver, a printer driver, an output driver, and a user interface.

30. The method of claim 18 in which the device dependent components include information characterizing the output device.

31. The method of claim 18 in which the information characterizing the output device includes one or more of a make identifier, a model identifier, an output device type identifier, an output data format identifier, and an output

device identifier.

32. The method of claim 18 in which the device dependent output data is received by an output controller before being delivered to the selected output device.

33. The method of claim 32 in which the output controller is internal to the output device.

34. The method of claim 32 in which the output controller is one of a server, an external controller and a data access point.

35. The method of claim 32 in which the output controller performs, at least a partially, raster image processing on the data content.

36. The method of claim 32 further including converting the output data content into a form compatible to the output engine.

37. The method of claim 32 in which the output device is a printer having a printer controller and the method further includes converting the output data into a form compatible with the printer controller.

38. In a computer readable medium, software for rendering data content that is accessible from an information apparatus, comprising:

software for selecting an available output device having a device-specific output engine;

software for automatically uploading to the information apparatus a device-dependent component corresponding to the output device;

software for generating at the information apparatus device-specific output data in accordance with the device-dependent component; and

software for transmitting the output data from the information apparatus to the output device for rendering.

39. The medium of claim 38 further comprising software for providing payment information from the information apparatus to pay for the rendering provided by the output device.

40. A method of rendering data content that is accessible from an information apparatus, comprising:

identifying a first available output device from among one or more output devices that can be accessed by the information apparatus;

establishing bi-directional communication between the information apparatus and the first available output device;

receiving from the first available output device information regarding a feature of the first available output device;

determining from the information whether the feature of the first available output device meets a predefined criterion for rendering the data content; and

transmitting the data content to the first available output device if the feature meets the predefined criterion.

41. The method of claim 40 in which it is determined that the feature of the first available output device does not meet the predefined criterion, the method further comprising:

identifying a second available output device from among one or more output devices that can be accessed by the information apparatus;

establishing bi-directional communication between the information apparatus and the second available output device;

receiving from the second available output device information regarding a feature of the second available output device;

determining from the information whether the feature of the second available output device meets the predefined criterion for rendering the data content; and

transmitting the data content to the second available output device if the feature meets the predefined criterion.

42. The method of claim 40 in which it is determined that the feature of the first available output device does not meet the predefined criterion, the method further comprising providing at the information apparatus a user indication that the first available output device does not meet the predefined criterion.

43. The method of claim 42 further comprising providing at the information apparatus a user indication of a user-selectable option to cancel the rendering of the data content.

44. The method of claim 42 further comprising providing at the information apparatus a user indication of a user-selectable option to attempt to identify an available output device with a feature that meets the predefined criterion.

45. The method of claim 40 in which the bi-directional communication includes a wireless communication.

46. The method of claim 40 in which the identifying of an available output device involves user input.

47. The method of claim 40 in which the identifying of an available output device involves a discovery process.

48. The method of claim 40 in which the feature includes information characterizing the output device.

49. The method of claim 40 in which the feature includes a device dependent parameter related to the output device.

50. The method of claim 40 in which the feature includes information about a service provided by the output device.

51. The method of claim 50 in which the information about the service provided by the output device includes one or more of price, quality of service, and availability.

52. The method of claim 40 in which the predefined criterion includes user input.

53. The method of claim 40 in which the predefined criterion includes a predetermined default parameter stored in the information apparatus.

54. The method of claim 40 in which the predefined criterion includes a predefined algorithm stored in the information apparatus.

55. The method of claim 40 further comprising processing the data content to a form that is compatible with the output device before transmitting the data content to the output device.

56. The method of claim 40 in which the information apparatus includes one of a mobile computing device, a pervasive device, a digital camera, and a personal computer.

57. The method of claim 40 in which the output device includes one of a printing device, a display device, and an audio output device.

58. The method of claim 40 in which the transmitted data content includes compressed data.

59. In a computer readable medium, software for rendering data content that is accessible from an information apparatus, comprising:

software for identifying a first available output device from among one or more output devices that can be accessed by the information apparatus;

software for establishing communication between the information apparatus and the first available output device;

software for receiving from the first available output device information regarding a feature of the first available output device;

software for determining from the information whether the feature of the first available output device meets a predefined criterion for rendering the data content; and

software for transmitting the data content to the first available output device if the feature meets the predefined criterion.

60. The medium of claim 59 in which it is determined that the feature of the first available output device does not meet the predefined criterion, the medium further comprising:

software for identifying a second available output device from among one or more output devices that can be accessed by the information apparatus;

software for establishing communication between the information apparatus and the second available output device;

software for receiving from the second available output device information regarding a feature of the second available output device;

software for determining from the information whether the feature of the second available output device meets the predefined criterion for rendering the data content; and

software for transmitting the data content to the second available output device if the feature meets the predefined criterion.

61. The medium of claim 59 in which it is determined that the feature of the first available output device does not meet the predefined criterion, the medium further comprising software for providing at the information apparatus a user indication that the first available output device does not meet the predefined criterion.

62. The medium of claim 61 further comprising software for providing at the information apparatus a user indication of a user-selectable option to cancel the rendering of the data content.

63. The medium of claim 61 further comprising software for providing at the information apparatus a user indication of a user-selectable option to attempt to identify an available output device with a feature that meets the predefined criterion.

64. A method of rendering data content that is accessible from an information apparatus, comprising:

searching for a first available output device from among one or more output devices that can be accessed by the information apparatus;

upon discovery of a first available output device, establishing bi-directional communication between the information apparatus and the first available output device;

receiving from the first available output device information regarding a feature of the first available output device;

determining from the information whether the feature of the first available output device meets a predefined criterion for rendering the data content; and

transmitting the data content to the first available output device if the feature meets the predefined criterion.

65. The method of claim 64 in which a first available output device is not discovered in the search, the method further comprising providing at the information apparatus a user indication that a first available output device has not been discovered.

66. The method of claim 64 further comprising providing at the information apparatus a user indication of a user-selectable option to cancel the rendering of the data content.

67. The method of claim 64 further comprising providing at the information apparatus a user indication of a user-selectable option to again attempt to identify an available output device.

68. The method of claim 64 in which the bi-directional communication includes a wireless communication.

69. The method of claim 64 in which the searching for a first available output device involves user input.

70. The method of claim 64 in which the feature of the first available output device includes a device dependent parameter related to the output device.

71. The method of claim 64 in which the feature of the first available output device includes one or more of price, quality of service, and availability.

72. The method of claim 64 in which the predefined criterion includes user input.

73. The method of claim 64 in which the predefined criterion includes a predetermined default parameter stored in the information apparatus.

74. The method of claim 64 in which the predefined criterion includes a predefined algorithm stored in the information apparatus.

75. The method of claim 64 further comprising processing the data content to a form that is compatible with the output device before transmitting the data content to the first available output device.

76. In a computer readable medium, software for rendering data content that is accessible from an information apparatus, comprising:

software for searching for a first available output device from among one or more output devices that can be accessed by the information apparatus;

software for establishing bi-directional communication between the information apparatus and the first available output device upon discovery of a first available output device;

software for receiving from the first available output device information regarding a feature of the first available output device;

software for determining from the information whether the feature of the first available output device meets a predefined criterion for rendering the data content; and

software for transmitting the data content to the first available output device if the feature meets the predefined criterion.

77. The medium of claim 76 in which a first available output device is not discovered in the search, the medium further comprising software for providing at the information apparatus a user indication that a first available output device has not been discovered.

78. A method of rendering data content that is accessible from an information apparatus, comprising:

discovering one or more available output devices that are available to render the data content;

generating at the information apparatus a list of the one or more available output devices that are discovered and specifying at least one characteristic of each of the available output devices;

determining from the characteristics of the one or more available output devices which of them meets a predefined criterion for rendering the data content; and

establishing communication with each of the one or more available output devices that meets the predefined criterion.

79. The method of claim 78 in which determining which of the one or more available output devices meet the predefined criterion is performed automatically by the information apparatus.

80. The method of claim 78 in which determining which of the one or more available output devices meet the predefined criterion is performed by a user.

81. The method of claim 78 in which the discovering of the one or more available output device includes a wireless communication.

82. The method of claim 78 in which the predefined criterion includes one or more of price, quality of service, and availability.

83. The method of claim 78 in which the predefined criterion includes user input.

84. The method of claim 78 in which the predefined criterion includes a predefined algorithm stored in the information apparatus.

85. In a computer readable medium, software for rendering data content that is accessible from an information apparatus, comprising:

software for discovering one or more available output devices that are available to render the data content;

software for generating at the information apparatus a list of the one or more available output devices that are discovered and specifying at least one characteristic of each of the available output devices;

software for determining from the characteristics of the one or more available output devices which of them meets a predefined criterion for rendering the data content; and

software for establishing communication with each of the one or more available output devices that meets the predefined criterion.

86. The medium of claim 85 in which the software for determining which of the one or more available output devices meet the predefined criterion is performed automatically by the information apparatus.

87. The medium of claim 85 in which the software for determining which of the one or more available output devices meet the predefined criterion is performed by a user.